ECONOMIC BENEFITS OF OUTFITTED HUNTS FOR BARREN-GROUND CARIBOU IN THE NORTHWEST TERRITORIES

Northwest Territories Resources, Wildlife & Economic Development

103-05935/

ECONOMIC BENEFITS OF OUTFITTED HUNTS FOR BARREN-GROUND CARIBOU IN THE NORTHWEST TERRITORIES

BRUCE ASHLEY

Wildlife and Fisheries Division

Department of Resources, Wildlife and Economic Development

Government of the Northwest Territories

Yellowknife, NWT

2000

Northwest Territories Resources, Wildlife and Economic Development

File Report No. 129

Abstract

A survey of the barren-ground caribou outfitting industry in the North and South Slave Regions of the Northwest Territories (NWT) was done during the winter of 1999/2000 to estimate the benefits of the industry to the NWT. Outfitter revenue and expenditures, and expenditures of non-resident hunters using the services of these outfitters were estimated. This information was used in an input-output analysis to estimate the NWT economic impacts of barren-ground caribou outfitting. The contribution to NWT gross domestic product of barren-ground caribou outfitting was estimated to be $3.13 million in 1999. Between 109 and 179 seasonal jobs and 880 person-weeks of employment were estimated to have been provided to NWT residents by barren-ground caribou outfitters in 1999. The NWT economic impact of each non-resident barren-ground caribou hunter was estimated to be $5,300. Each caribou allocated to outfitting was estimated to have an NWT economic impact of $3,400.

Executive Summary

Barren-ground caribou outfitting in the North and South Slave Regions of the Northwest Territories (NWT) in 1999 consisted of ten businesses that provided outfitted hunts to 595 non-resident hunters. This group of outfitters has grown rapidly since caribou outfitting began in the NWT in the early 1980s. For example, in 1993, nine outfitters provided hunts to 303 hunters.

A survey of the barren-ground caribou outfitting industry in the North and South Slave Regions of the Northwest Territories (NWT) was done during the winter of 1999/2000 to estimate the benefits of the industry to the NWT. Outfitter revenue and expenditures, and expenditures of non-resident hunters using the services of these outfitters were estimated. This information was used in an input-output analysis to estimate the NWT economic impacts of barren-ground caribou outfitting.

The contribution to NWT gross domestic product (GDP) of barren-ground caribou outfitting was estimated to be $3.13 million in 1999, based on an input-output analysis of $3.26 million in revenue to the outfitters and a further $979,000 in non-outfitter expenditures by non-resident barren-ground caribou hunters while in the NWT.

Between 109 and 179 seasonal jobs and 880 person-weeks of employment were estimated to have been provided in 1999 to Northwest Territories' residents by barren-ground caribou outfitters.

Barren-ground caribou outfitters and non-resident barren-ground caribou hunters paid an estimated $926,000 in government taxes of which at least $490,000 was to the Government of the NWT, mainly as hunting licence, tag and trophy fees.

A substantial portion of caribou meat harvested by non-resident hunters in outfitted hunts for barren-ground caribou was given to residents in NWT communities. The economic value of this meat was estimated to be between $160,100 and $291,700, with a further $48,700 to $56,500 worth of caribou meat consumed in hunting camps replacing imported meats.

This report shows the economic impact of non-resident hunters to be large relative to the average visitor to the Northwest Territories. Though absolute numbers of non-resident hunters are small compared to all visitors to the Northwest Territories, non-resident hunters make larger-than-average expenditures while visiting the NWT.

The NWT economic impact of each non-resident barren-ground caribou hunter was estimated to be $5,300. Each caribou allocated to outfitting was estimated to have an NWT economic impact of $3,400.

Table of Contents

Abstract ii
Executive Summary iii
List of Figures v
List of Tables v

Introduction 1
Purpose of the Study 4
Defining and Measuring Economic Benefits 6
  Direct Benefits 7
  Indirect Benefits 7
    Gross Business Production 7
    Gross Domestic Product (GDP) 8
    Government Revenue from Taxes 8
    Personal Incomes 9
    Number of Jobs 9
  Replacement Value of Caribou Meat 9
  Other Benefits - Non-Economic 10
Gathering and Analysis of Data 11
  Outfitter Interviews 11
  Outfitter Revenue and Expenditures 11
  Hunter Expenditures 12
  Input-Output Analysis 12
  Valuation of Caribou Meat 13
Results and Discussion 15
  Outfitter Revenue and Expenditures 15
  Hunter Expenditures 16
  Results of the Input-Output Analysis 16
    Gross Domestic Product 16
    Tax Revenue 17
    Labour Income 17
    Jobs 17
  Replacement Value of Caribou Meat 19
  Economic Benefits Summary 22
  Other Benefits - Non-Economic 24
Conclusion 25
Acknowledgements 27
Personal Communication 27
Literature Cited 28

Appendix 1. NWT barren-ground caribou outfitters jobs detail – 1999 31
Appendix 2. Meat pricing in Yellowknife 32
Appendix 3. Replacement value calculations of caribou meat from barren-ground caribou outfitters 33

List of Figures

Figure 1. Location of NWT barren-ground caribou outfitters hunting camps 2
Figure 2. Economic benefits framework 6

List of Tables

Table 1. Expenditures of barren-ground caribou outfitters in the NWT 15
Table 2. Expenditures of non-resident barren-ground caribou hunters in the NWT 16
Table 3. NWT barren-ground caribou outfitters jobs summary 18
Table 4. Replacement value (weighted-average method) of caribou meat 20
Table 5. Replacement value (bulk-pack method) of caribou meat 21
Table 6. Economic benefits summary of NWT barren-ground caribou outfitting 23
Table 7. Community benefits summary 24

Introduction

The first outfitted hunts in the Northwest Territories (NWT) were for bison in the Fort Smith region. These hunts began in 1959, but were cancelled in 1962 due to an outbreak of anthrax (Murphy 1976). The initial success of these hunts in attracting international trophy hunters set into motion a request in 1963 to the Territorial Council by one of the two bison outfitters to open the Mackenzie Mountains to outfitting.

The Mackenzie Mountains were a game preserve between 1938 and 1953. In 1956 and 1957, the Canadian Wildlife Service conducted wildlife surveys in the Mackenzie Mountains and concluded that they would provide a high percentage of trophy-quality animals (Murphy 1976). So in 1965, following some exploratory hunts subsequent to the 1963 request to open the area to outfitting, the Mackenzie Mountains were opened to six big-game outfitters (Latour & MacLean 1994). Latour & MacLean (1994) note that the new industry was expected to promote tourism and provide local economic benefits (presumably by creating local business opportunities and seasonal employment for residents).

Presently, the eight Mackenzie Mountain (formerly Class "A") outfitters operating within the NWT offer hunts for Dall's sheep and to a lesser extent woodland caribou, moose, mountain goat, wolverine and wolf. Latour & MacLean (1994) report the annual mean numbers of non-resident hunters in the Mackenzie Mountains and the annual mean number of Dall's sheep harvested by them during the 1980s to be 221 and 161, respectively. In the 1990s, these averages appear to have increased to 356 and 198 respectively (Veitch & Simmons 2000). However, Alasdair Veitch (pers. comm.) has suggested that, in addition to recessionary economic conditions in the early to mid-1980s, some of the increase in the 1990s may be a result of more effective harvest monitoring.

Four years after the opening of the Mackenzie Mountains to big-game outfitting, outfitted hunts for polar bears began in the NWT (which at that time included Nunavut) with 3 hunts in the initial winter season of 1969/70 (Lee *et al.* 1994). By the late-1980s, an average of 66 outfitted hunts were occurring annually (Lee *et al.* 1994). While most of these hunts occurred in Nunavut, starting in 1970/71, several Inuvialuit communities also offered outfitted hunts for polar bear through their Hunters' and Trappers' Committees (John Nagy pers. comm.). Over the years these Hunters and Trappers Committee (formerly Class "C") outfitters expanded by offering outfitted hunts for muskoxen starting in 1979, barren-ground caribou in the early to mid-1980s, and barren-ground grizzly bears in 1987 (Anne Gunn pers. comm.; John Nagy pers. comm.). Estimates for the numbers of outfitted hunts in the 1996/97 and 1997/98 seasons range from 38 to 48 polar bears, 86 to 138 muskoxen, 35 to 112 barren-ground caribou, and 10 to 12 grizzly bears (Tim Devine, pers. comm.).

The next expansion of big-game outfitting in the NWT followed changes to NWT wildlife legislation that allowed outfitted hunts for barren-ground caribou. Starting in 1982 (Case *et al.* 1996), five Class "B" outfitters (as they were then known) were licensed and began hunting operations (Exceleration Corp. 1994) along and to the north-east of the tree-line between Great Slave Lake and Coronation Gulf (Figure 1).[1]

---

[1] Further general mention of "outfitters" refers to the barren-ground caribou outfitters operating in NWT wildlife management zones "R" and "U". Under prior regulations, these outfitters operated in Wildlife

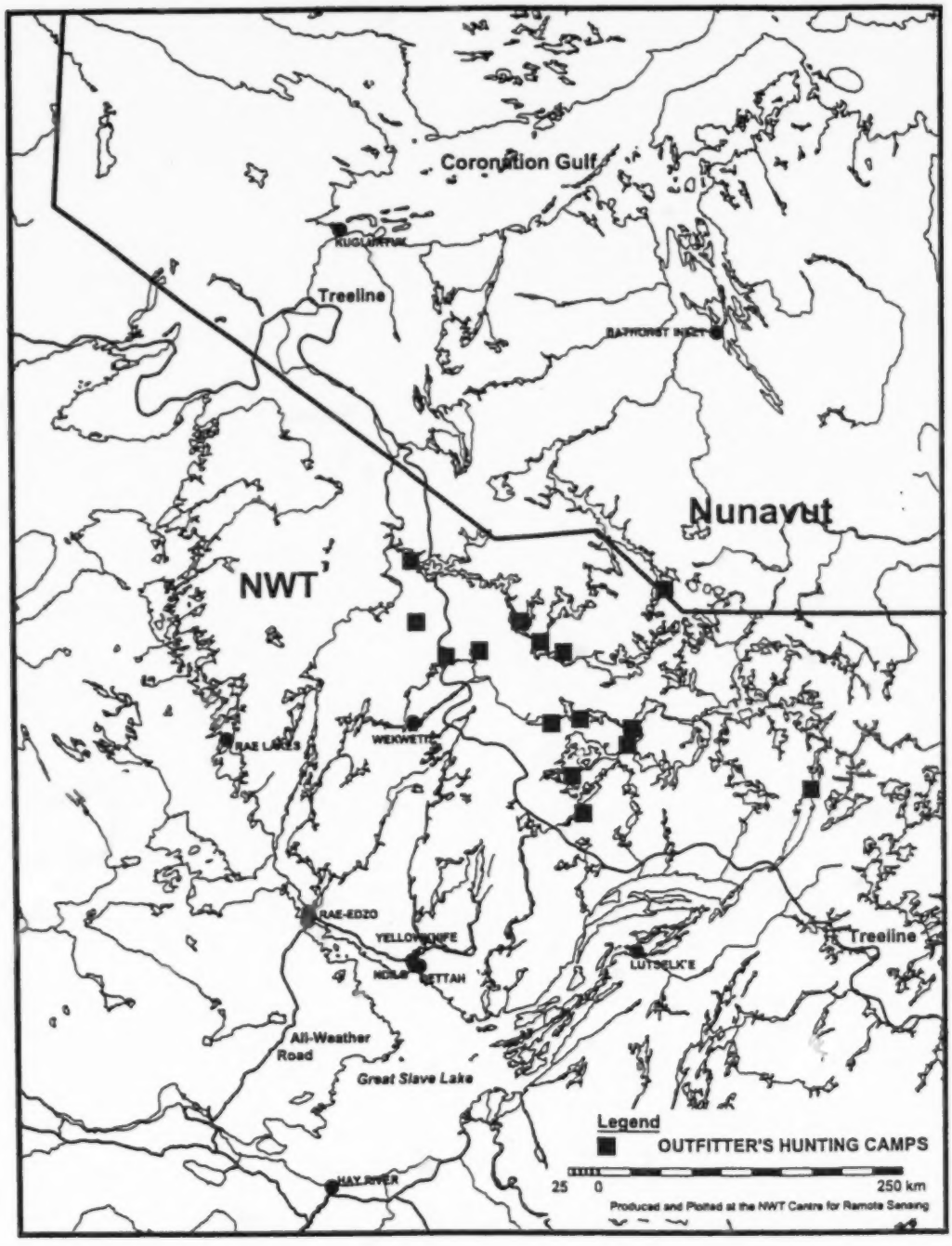

Figure 1. Locations of NWT barren-ground caribou outfitter hunting camps.

Management Unit "F" and were licensed as Class "B" outfitters. This group of outfitters does not include the Inuvik Region outfitters, who also offer outfitted hunts for barren-ground caribou.

Within a couple of years, the Class "B" (barren-ground caribou) outfitters benefited from a change to species listings by the Boone and Crocket Club. This trophy hunting organisation maintains listings of record trophies, and in 1984 it created a separate listing for central Canadian barren-ground caribou (Boone and Crockett Club 1984). The new listing was also adopted by two other trophy hunting organisations. This encouraged international trophy hunters to hunt the newly-listed animal and the NWT barren-ground caribou outfitters were best able to accommodate this new demand (relative to other barren-ground caribou in Alaska or Quebec). From 1982 to 1984, fewer than 50 barren-ground caribou were harvested by non-residents in NWT outfitted hunts, but rapid growth occurred through the late 1980s and early 1990s resulting in more than 500 caribou harvested by non-residents in outfitted hunts by 1995 (Case *et al.* 1996). During this period, the number of outfitters also increased to nine (Exceleration Corp. 1994), with a 10th outfitter licensed and operating by 1997. Growth has continued, and 921 caribou were harvested by 595 non-resident hunters in outfitted hunts in 1999.

Non-resident barren-ground caribou hunters are interested in hunting large male animals; they have the largest antlers and make the most impressive trophy mounts. In fact, NWT wildlife regulations restrict non-resident barren-ground caribou hunters to hunting only male barren-ground caribou. However, non-resident barren-ground caribou hunters may purchase more than one barren-ground caribou tag for their hunt, and outfitters sell both one and two caribou hunts.

Most of the harvest of barren-ground caribou by non-resident hunters at outfitter camps is considered to be from the Bathurst herd. However, the quota of the most recently established outfitter, whose camp is furthest east on Artillery Lake, is taken from the Beverly herd.

Due to the close proximity of the Bathurst herd's winter range to Yellowknife and its hunters, and the all-season and winter ice roads in the North Slave region, the Bathurst herd is the most heavily harvested barren-ground caribou herd in the NWT (Case *et al.* 1996). Both the Bathurst and Beverly herds are considered to be in stable condition, and the harvest levels from all sources were within sustainable limits in the mid-1990s (Case *et al.* 1996; Gunn *et al.* 1997; Williams 1995). However, both herds are due for recurring periodic surveys to update population sizes.

Despite the stability of the Bathurst herd during the past decade, and the heavy but sustainable harvest from it, there is no management plan for the herd. Previous attempts to establish a management plan were made in the late 1980s and early 1990s (Case *et al.* 1996), but did not succeed, although a draft management plan was produced during this time (Renewable Resources 1988). Organisations with an interest in the Bathurst caribou herd have again had meetings in 2000 to re-establish a process towards a Bathurst herd management plan.

Purpose of the Study

As noted above, the NWT big-game outfitting industry originated, at least in part, to promote tourism and local benefits in the NWT (Latour & MacLean 1994), presumably to create business opportunities, jobs and personal income for NWT residents. The context for this goal was that wildlife was a public asset to be used to develop the economy of the North. Murphy (1976) notes Canadian Wildlife Service advice provided to the Territorial Council regarding the potential for outfitting in the Mackenzie Mountains. This advice suggested that the high percentage of trophy quality big-game animals in the Mackenzie Mountains were only very lightly hunted by NWT residents, and therefore had unrealised cash value to the economy. If business and non-residents "used" this public asset, jobs and income (presumably for NWT-residents) would result.

A number of studies have reported on the success the outfitting industry has had in achieving economic benefits such as business ownership by, and jobs and personal income for NWT residents. Murphy (1976) notes the decline in the level of NWT-resident guides in the Mackenzie Mountains in the first 10 years of operation, although there is no discussion of the possible reasons for the decline. Murphy also notes that two of the original six Mackenzie Mountain outfitters were NWT-residents. Presently, all eight outfitters are non-NWT-residents.

Exceleration Corp. (2000) estimated the economic benefits to the NWT of the eight Mackenzie Mountain outfitters in 1996 to be $1.8 million. This benefit was based on gross outfitter revenues conservatively estimated at $5.4 million from 387 non-resident hunters, non-outfitter expenditures of non-resident hunters while in the NWT, and an estimate of the economic value of the meat from these hunts given to NWT communities. Veitch & Simmons (2000) report the non-resident hunter harvest from the Mackenzie Mountains in 1996 to be 201 Dall's sheep, 175 woodland (mountain) caribou, and 64 other big-game animals.

In 1993, the Central Canadian Barrenground Caribou Outfitters and Guides Association and the Government of the NWT studied a number of issues of interest to barren-ground caribou outfitting. One of the objectives of the study (Exceleration Corp. 1994) was to estimate the contribution to the NWT economy of what were then Class "B" outfitters in wildlife management unit "F". Exceleration Corp. (1994) reported that the total NWT economic impact of the nine barren-ground caribou outfitters in 1993 was $1.92 million[2]. This was based on $1.65 million in gross outfitter revenue from 293 non-resident hunters who harvested 409 barren-ground caribou, and an additional $350,000 in non-outfitter expenditures by the hunters while in the NWT.

In contrast to the Mackenzie Mountain outfitters, a high proportion of NWT-resident ownership of barren-ground caribou outfitting businesses has been the norm.

---

[2] Exceleration Corp. (1994, 2000) did not provide the source for multipliers used to determine NWT economic impact and the multipliers used for the calculations are undoubtedly too high. It appears that economic multipliers may have been confused for intensity ratios. If this were the case, Exceleration Corp.'s (1994, 2000) estimates of contribution to NWT GDP (one conventional measure of economic impact) would actually be the total territorial, national and international economic impact of NWT barren-ground caribou outfitting. For more detailed explanation of input-output models, see Bureau of Statistics, Government of the NWT (1993).

As noted in the introduction, barren-ground caribou outfitting in the NWT has grown very quickly in the past decade, with both non-resident hunter numbers, and caribou harvested by them, more than doubling since 1993. This rapid growth begs the question: has the high degree of economic benefits relative to gross outfitter revenues been maintained?

This present study was undertaken in co-operation with the barren-ground caribou outfitters to estimate and document the economic[3] benefits of the barren-ground caribou outfitting industry to the NWT economy in 1999. The economic benefits of interest are defined and discussed in the following section. They include NWT business activity, jobs and income to NWT residents, expenditures made by barren-ground caribou outfitters in providing outfitted hunts to non-resident hunters, and expenditures made by hunters on goods and services they purchased while in the NWT. Economic benefits also include the imputed replacement value of caribou meat harvested by non-resident barren-ground caribou hunters and given to residents of the NWT.

The next section presents an economic benefits framework to explain the meaning and measurement of economic benefits.

---

[3] The term "economic" is used in its broad sense. As commonly understood, it includes commercial and financial activity in the modern economy. But it also includes the more fundamental meaning of "economic": the provision of one's basic food, clothing and shelter needs, whether through the purchase of goods and services at market prices, through an exchange of other goods and services, or through personal harvesting of resources from the land.

Defining and Measuring Economic Benefits

A useful framework for explaining and estimating economic benefits of wildlife and wildlife-related activities has been developed by the Canadian Wildlife Service (Filion *et al.* 1990; Filion *et al.* 1994; Leigh *et al.* 2000). Although economic value frameworks have been developed and used in wildlife and environmental contexts (Langford & Cocheba 1978, Adamowicz *et al.* 1991, Adamowicz 1992, Brown 1992), value frameworks tend not to explicitly show the relationship between economic value and other economic benefits. The Canadian Wildlife Service framework, however, includes both, and clearly shows the relation between the two: economic value as benefit to individuals, and economic benefit as the collective benefits to an economy[4]. Generally, economic benefits include economic value.

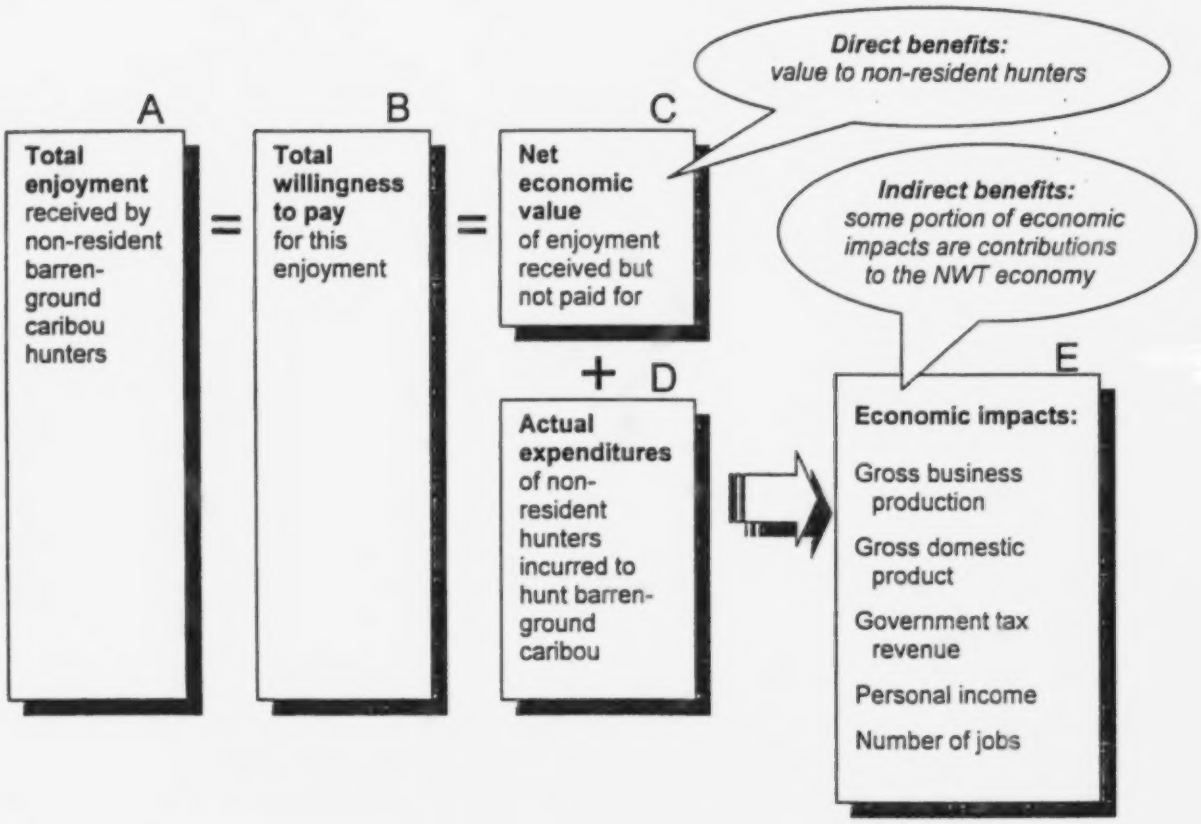
A
Total enjoyment received by non-resident barren-ground caribou hunters
=
B
Total willingness to pay for this enjoyment
=
C
Net economic value of enjoyment received but not paid for
Direct benefits: value to non-resident hunters
Indirect benefits: some portion of economic impacts are contributions to the NWT economy
+ D
Actual expenditures of non-resident hunters incurred to hunt barren-ground caribou
E
Economic impacts:
Gross business production
Gross domestic product
Government tax revenue
Personal income
Number of jobs

Figure 2. Economic benefits framework with specific reference to outfitted hunts for barren-ground caribou by non-resident hunters (based on Filion *et al.* 1990; Filion *et al.* 1994; Leigh *et al.* 2000).

[4] A more complete explanation can be found in Walsh (1986), Decker & Goff (1987) and Leigh *et al.* 2000.

Despite the more comprehensive framework of the Canadian Wildlife Service, it is relatively simple and flexible. Its use in the time-series of studies on the importance of wildlife to Canadians, funded and carried-out by a federal-provincial-territorial task force (Filion *et al.* 1990; Filion *et al.* 1994; Leigh *et al.* 2000), is another factor in favour of its adoption for the present study.

The framework is shown in Figure 2 with reference to outfitted hunts for barren-ground caribou in the NWT. This economic benefits framework identifies two types of benefits, direct and indirect, which relate to economic value and economic benefit as mentioned above. Both of these are discussed below with specific reference to outfitted hunts for non-residents. However, the Canadian Wildlife Service economic benefits framework could be applied to any single wildlife-related activity or group of activities: bird watching, recreational fishing, waterfowl hunting, even watching wildlife programs on television.

Direct Benefits

Direct benefits are the value that people place on wildlife and wildlife-related activities, such as hunting. Most people who hunt derive enjoyment from the activity of hunting (A in Figure 2), and are prepared to pay (total willingness-to-pay) for that enjoyment (B in Figure 2). For example, big-game hunters travel to the NWT and are willing to spend substantial amounts of money for an opportunity to take a central Canadian barren-ground caribou trophy. Total willingness to pay (B in Figure 2) can be divided into two parts. The actual expenditures of hunters are represented by D in Figure 2. In addition to actual expenditures for hunting, hunters receive value from hunting for which they do not pay. This is known as net economic value (or net willingness-to-pay), and best represents the direct benefits[5] hunters derive from hunting. These direct benefits are marked as C in Figure 2.

Indirect Benefits

Figure 2 also shows indirect benefits of hunting. Indirect (or secondary) benefits are the impacts on an economy (E) that result from an economic activity. In the case of barren-ground caribou outfitting, the economic activity is the expenditures of non-resident barren-ground caribou hunters (D). A number of economic impacts result from these expenditures as shown in box E[6].

Gross Business Production

Gross business production is a measure of the overall business activity generated by expenditures and includes the total value of final and intermediate goods and services in the business sector (Filion *et al.* 1994).

---

[5] The use of the terms direct and indirect benefits may seem counterintuitive, especially if thought of as analogous to tangible (expenditures) and intangible (value received but not paid for) benefits. However, the terms direct and indirect (or secondary) benefits are well-established in the economic literature.

[6] See the previous footnote on the use of direct and indirect in the context of benefits.

Gross Domestic Product (GDP)

Gross domestic product is one of the most widely used indicators of economic performance. It measures the total value at market prices of the production of final goods and services within an economy. Duplications, such as intermediate expenses that do not represent "value-added" production, are eliminated.

GDP can be divided into 3 component activities and impacts: direct, indirect [7] and induced. These activities and respective impacts are outlined below.

Direct activities are the purchases made by hunters for their hunting. For example, non-resident hunters purchase outfitted hunts. They also purchase airline tickets, accommodations and meals, and other goods and services while on their hunting trip. And, of course, they purchase firearms, ammunition, and other hunting supplies like special clothing. These have direct impacts on the economy.

An important distinction should be made at this point. Some of these expenditures will be made outside the NWT economy, as opposed to expenditures on goods and services purchased from NWT businesses. For example, firearms, ammunition, and other hunting supplies used by non-resident hunters visiting the NWT are most likely purchased in their home states or provinces. These expenditures will have no impact on the NWT economy. This distinction between domestic and external expenditures also applies to the two components of GDP discussed below.

Each business that sells goods and services to non-resident hunters must purchase goods and services from other businesses and from individuals. For example, outfitters purchase labour from individuals who work as hunting guides. Outfitters also purchase air charter services from airlines, food and other supplies from wholesale businesses, and many other services like insurance, accounting, and expediting. The purchase of goods and services by outfitters and others businesses that sell goods and services to non-resident hunters are referred to as indirect activity. These have indirect impacts on the NWT economy, assuming the expenditures are made within the NWT.

The last component of GDP is induced impact and results from induced activity. Induced activity is household or personal expenditures on goods and services, which contrasts with direct and indirect activities that are expenditures by businesses. Some portion of household or personal income results from income earned directly or indirectly from expenditures by non-resident hunters on outfitted hunts for barren-ground caribou.

Direct, indirect and induced impacts within the NWT collectively represent NWT GDP which, as shown in box E of Figure 2, makes up one part of indirect benefits or contributions to the NWT economy.

Government Revenue from Taxes

Government revenues result from economic activity in a number of ways. Governments set fees for licences and permits required to undertake particular regulated activities. In the case of barren-ground caribou outfitting, fees apply to the licensing of big-game outfitters as well as the licensing of hunters through tag sales. Non-residents also pay

---

[7] Direct and indirect impacts differ from direct and indirect benefits.

trophy fees for animals killed under the authority of a tag and subsequently exported from the NWT. Tourism and wildlife legislation also require outfitters to hold licences for operating commercial accommodation facilities and for serving game meat to paying clients. And, of course, outfitters pay lease fees for, or taxes on, the land occupied by their hunting camps.

Income taxes also apply to the various corporate and personal incomes earned through activity that results directly or indirectly from outfitted hunts for barren-ground caribou.

Personal Incomes

An important part of contribution to GDP, as well as contribution to the economy in general, is personal incomes, also known as labour income. The proportion of personal incomes that result from activity in an industry will vary with the relative labour intensity of that industry, as well as the labour intensity that is characteristic of the indirect activity.

Number of Jobs

The personal incomes noted immediately above will be associated with jobs. Most of these will be in the outfitting industry, but jobs in other industries will also result from the indirect and induced activity created by the expenditures of non-resident barren-ground caribou hunters.

Replacement Value of Caribou Meat

The harvest of barren-ground caribou by non-resident hunters produces food. Some of this food is exported by the hunters for their own use. However, some of the meat harvested by non-resident hunters remains in the NWT. This meat is not distributed through markets, so it does not have a market price or value, as it would if it had been purchased from a store at a known price.

Non-market valuation techniques are used to assign an appropriate economic value to goods and services that are not distributed through markets. Usher (1976) details the issues associated with the economic valuation of country food in Canada's North. Based on Usher (1976), the appropriate technique to assign value to the caribou meat harvested by non-resident hunters that remains in the NWT is "substitution cost", commonly known as replacement value. An appropriate substitute food product with a known market price replaces the caribou meat. For example, if beef is considered to be an appropriate substitute food product and sells for $15 per kg in the store in Wekweti, $15 per kg is the replacement value of caribou meat in Wekweti.

The value of caribou meat as food is not included in Figure 2. Filion *et al.* (1994) did not explicitly include food value of game meat in their economic benefits framework, but it is part of net economic value (box C) in Figure 2. When barren-ground caribou meat harvested by non-resident hunters is given to NWT residents, the value of that meat then becomes of direct benefit to the NWT, a benefit that is in addition to the expenditures and economic impacts of barren-ground caribou outfitting.

Other Benefits - Non-Economic

Replacement values for country food cannot incorporate non-economic values associated with the harvesting or use of wildlife for food or other basic needs. The most obvious example of such non-economic values are cultural values associated with wildlife use by Aboriginal people.

Integrating non-economic benefits into an economic analysis is difficult at best. Non-economic benefits that result from outfitted hunts for barren-ground caribou will be briefly discussed in this report, but no attempt is made to quantify them.

Gathering and Analysis of Data

To estimate the economic benefits of barren-ground caribou outfitting in the NWT in 1999, a survey was done between January and March 2000. There were three parts to the survey and each gathered different information. Each part of the survey is discussed in more detail below.

Outfitter Interviews

Short interviews, in person or by phone, were done with seven of the ten barren-ground caribou outfitters. While efforts were made to interview all ten outfitters, some interviews could not be arranged in the time available.

The outfitter interviews served a number of purposes, including:

- identifying the number, length and type of jobs within each of the outfitting operations, and the community of residence of staff,
- identifying other (non-financial) economic benefits that result from the outfitting operations (for example the quantity of caribou meat not exported by hunters but given to individuals and organisations in the NWT),
- familiarisation with the outfitting operations, which helped in the design of the hunter interview questions, and in the interpretation of results, and
- an opportunity to deliver and explain to outfitters the "outfitter financial information form" (discussed next).

Information collected from the sample of seven outfitters was extrapolated to represent all ten outfitters. This was done based on the number of non-resident hunters for which each outfitter provided hunts. Thus any collective data that resulted from the sampling of seven outfitters was multiplied by a factor of 1.25, since the seven outfitters in the sample hosted 476 hunters in 1999, while all ten outfitters hosted 595 hunters.

Assumptions are made by this extrapolation of data from the sample of seven outfitters to all ten outfitters. Mainly, it is assumed that the costs and revenues per hunting client of outfitters in the sample are the same, as those for outfitters not sampled. This is obviously not true, since variation in costs and revenues per hunter existed between the outfitters that were sampled. Thus, the accuracy of the results of the analyses are subject to how closely that assumption reflects reality. However, without a larger sample from which to base data, no other reasonable method to extrapolate sample data to represent ten outfitters was determined.

Outfitter Revenue and Expenditures

The "outfitter financial information form" was delivered to outfitters during or following the outfitter interview. Its purpose was to provide the 1999 operating revenues of outfitters, and the amount and categories of expenditures for the 1999 season. As each outfitter was interviewed and the "outfitter financial information form" explained and delivered, a two-digit numerical code was assigned to each outfitter. That code was placed on the "outfitter financial information form". The forms were completed by outfitters and returned by mail to an economic consultant (Ellis Consulting Services) for an input-

output analysis of the industry. The codes provided confidentiality of financial information for the outfitters.

The economic consultant received seven completed financial information forms and all were used in the input-output analysis. The same method to extrapolate financial data from the sample of seven outfitters to all ten outfitters was done by applying a factor of 1.25 to all financial data as outlined in the previous section.

Hunter Expenditures

Personal interviews were done with a sample of the 1999 season non-resident barren-ground caribou hunters. A listing of these hunters was obtained from the North Slave regional office of the Department of Resources, Wildlife and Economic Development (RWED), Government of the Northwest Territories, where the hunting licence and tag application process for non-resident barren-ground caribou hunters is administered. Because the outfitters vary considerably in the number of outfitted hunts they sell to non-resident hunters, a sample weighted to the number of hunters per outfitter was drawn.

According to the records of the North Slave regional office of RWED, 595 non-resident barren-ground caribou hunters used the outfitting services of barren-ground caribou outfitters in 1999. This number does not include cancellations or non-hunting clients of outfitters during the hunting season. From this hunter listing, a sample was drawn to allow 10% of the hunters to be interviewed with a surplus or contingency allowance when a hunter in the 10% sample could not be reached during the study. In total, 59 hunters were contacted and interviewed by phone, although in the process of attaining the 10% sample, an additional 25 hunters could not be reached for a variety of reasons.

Input-Output Analysis

As noted above, an economic consultant was contracted by RWED to do an input-output analysis on the financial information gathered from outfitters and hunters. Ellis Consulting Services has developed a Yellowknife regional input-output model from the application of expenditure patterns of businesses and consumers in Yellowknife.

Input-output models identify the flow of goods and services and the corresponding inverse flow of cash within an economy by identifying the links and their relative sizes between industries, businesses and consumers. This is done through business surveys by grouping businesses based on similarities of product and examining their financial statements for supplying industries and the corresponding relative proportions. Household expenditure surveys are also used. The structure of an economy can then be modelled and used for analysis of industry-specific investments and other impacts on an economy.

Input-output models normally attribute the impacts of large companies to the community where a company's head office is located. However, for regional input-output models, such an assumption under-estimates impacts since large companies often have regional offices, operations and staff, and incur regional expenditures. To adjust for this with respect to the air transportation as well as fuel expenditures of hunters that drove to Yellowknife, Ellis Consulting Services assumed that 25% of these expenditures were

within the Yellowknife regional economy. Thus if a hunter spent $1,000 on round trip airfare from his home to Yellowknife, $250 was considered to be spent in Yellowknife on air transportation.

Valuation of Caribou Meat

During interviews with outfitters, estimates of the amounts and uses of caribou meat harvested by non-resident hunters at hunting camps were made. Hunters exported some caribou meat from the NWT, and some meat was prepared for meals in camp. In addition, a substantial, but unknown, amount of meat was given to guides and other staff of outfitters and was transported to Yellowknife and other communities.

Assessing the value of this caribou meat is a challenge since it is not distributed through markets at known prices. Fortunately, there are many studies on the economic valuation of non-market goods and services, including the valuation of country food. Usher (1976) was one of the first to thoroughly examine the economic valuation of northern country foods.

Following Usher (1976), caribou meat harvested by non-resident hunters at outfitter camps was valued by the substitution cost technique usually referred to as replacement value. Beef was identified as the substitute or replacement meat and its market price applied to caribou meat on a "pound for pound" basis. Price surveys of various cuts of beef were made in three stores in Yellowknife on May 5 and 8, 2000[8] (Appendix 2). These cuts were assigned as low-, medium-, or high-quality cuts and an average price for each of the three types was calculated. The use of these prices as a substitute product price-base for valuing caribou meat is referred to in this report as the "weighted-average" method.

For purposes of estimating the value of caribou meat, the average edible weight of a barren-ground caribou harvested by non-resident hunters was assumed to be 45 kg. This choice is based on a literature review of edible weights of wildlife and fish in the NWT that have been used for country food replacement valuation and other purposes (Ashley In prep.).

An assumption was also made about the proportion of caribou meat that would be of low, medium and high quality: 55%, 15% and 30% respectively. Then, assumptions were made on the proportions of each of these three cut-qualities exported by hunters, prepared as meals in hunting camps, and given to staff of outfitters. Hunters were assumed to export two-thirds of the high quality cuts (20% of all meat by weight). Another 20% of this high quality meat was prepared as meals in camp (6% of all meat by weight). Almost all of the lower quality cuts were assumed to be given to staff of outfitters. Details of these proportions are shown in Appendix 3.

The "weighted-average" method of substitution cost is a relatively detailed technique. A simpler technique, which does not recognise varying quality of meat, was also

---

[8] Ideally, this beef price survey should have been done in August or September 1999, when the caribou meat was harvested and consumed. Although inflation has been on the rise in the past year, NWT Bureau of Statistics monthly updates of price indices for food purchased in stores during the past year show average annual increases of under 1%.

employed. One of the stores where meat prices were surveyed had a 22.7 kg (50 lb) beef bulk-pack consisting of 4.5 kg (10 lb) of each of five cuts which, on average, were of medium to high quality. The use of this bulk-pack price as a substitute product price-base for valuing caribou meat is referred to in this report as the "bulk-pack" method.

Both methods outlined above provided replacement values of caribou meat in Yellowknife. Adjustments to account for higher food prices in NWT communities were needed. Therefore, during interviews, outfitters were asked to which communities meat was given and in what quantity. The most recent (1997) community food price indices (Bureau of Statistics, Government of the NWT 1999) provided a means to adjust the Yellowknife replacement value of the caribou meat to the higher cost of food in applicable communities [9].

[9] The 1997 food price indices should be adjusted to 1999. However, Statistics Canada and the NWT Bureau of Statistics consumer price indices for Yellowknife show an increase of less than 1% in the price of food purchased from stores between 1997 and 1999, and a decrease of 0.6% in the price of fresh or frozen beef during the same period.

Results and Discussion

Outfitter Revenue and Expenditures

The ten NWT barren-ground caribou outfitters had an estimated combined gross revenue from outfitting in 1999 of $3.26 million. This resulted from outfitted hunts for 595 non-resident hunters who harvested 921 caribou, as well as a small number of wolves and wolverines.

In 1993, the nine operating barren-ground caribou outfitters had a combined gross outfitting revenue of $1.65 million from outfitted hunts for 303 non-resident hunters who harvested 409 caribou (Exceleration Corp. 1994). These numbers show growth of 100% in 6 years.

Of the $3.26 million in gross revenue in 1999, outfitters purchased an estimated $2.78 million in goods and services, of which $2.23 million was to businesses and individuals within the NWT (Table 1). In 1993, nine outfitters spent $1.25 million of their revenue on supplies and other business inputs within the NWT (Exceleration Corp. 1994). The four largest categories of expenditures in 1999 were wages and benefits, air transportation, supplies, and administration, which collectively account for 83% of the total. Over $550,000 or 25% of these expenditures in the NWT were on staff, and $585,000 or 26% were on air transportation.

Estimates of outfitter expenditures were based on a sample of seven of the 10 outfitters. The resulting sampling error for the average outfitters' expenditures in the NWT ($255,162) can be expressed in 95% confidence internals of plus or minus $133,621. In other words there is a 95% chance that the true average NWT expenditures of outfitters was between $121,541 and $388,783. This is a relatively large interval considering the 70% sample. However, with smaller populations (in this case, 10 outfitters), samples must be progressively larger to reduce sampling error. Despite efforts to interview all 10 outfitters to minimize sampling error, only seven outfitters were interviewed.

Table 1: Expenditures of Barren-ground Caribou Outfitters in the NWT during the 1999 Season

Direct Expenditures	($)	(%)
Wages and benefits	551,480	25%
Air transportation	585,484	26%
Supplies	344,218	15%
Sales expenses	36,038	2%
Maintenance	41,799	2%
Administration	379,718	17%
Licences	38,255	2%
Other financial costs	89,471	4%
Miscellaneous	75,084	3%
Depreciation	91,125	4%
Total Direct Expenditures	**2,232,671**	**100%**

Source: Ellis Consulting Services (2000)

Hunter Expenditures

Non-outfitter expenditures of non-resident hunters in 1999 were estimated to total $979,000 (Table 2), or average $1,646 per hunter. Hunting licence, tag and trophy fees exceeded $275,000 or 28% of the total. The next largest expenditure of $181,000 (19% of the total) was for tips to hunting guides and other outfitting staff.

Estimates of non-outfitter expenditures of non-resident hunters were based on a 10% sample of hunters. The resulting sampling error for the average non-outfitter expenditures ($1,646) can be expressed in 95% confidence internals of plus or minus $194. That is, there is a 95% chance that the true average non-outfitter expenditure of non-resident hunters was between $1,452 and $1,840.

Table 2: Non-outfitter Expenditures of Non-Resident Barren-ground Caribou Hunters in the NWT in the 1999 Season

Expenditures	($)	(%)
Airfare	142,478	15%
Ground transportation	11,663	1%
Meals and accommodation	141,265	14%
Hunting licence, tag and trophy fees	276,765	28%
Taxidermy and meat processing	136,584	14%
Tips to guides and others	181,494	19%
Gifts and souvenirs	88,950	9%
Total Expenditures	**979,198**	**100%**

Source: Ellis Consulting Services (2000)

Results of the Input-Output Analysis

The expenditures by outfitters (Table 1) and the expenditures by non-resident hunters (Table 2) were used for an input-output analysis to estimate the full economic impact of these expenditures on the Yellowknife regional economy (Ellis Consulting Services 2000). This impact includes the contribution to NWT gross domestic product (GDP), the number of jobs and personal income, and the tax revenue to government that resulted from these expenditures. Collectively these economic impacts are commonly referred to as "economic spin-offs" or "trickle-down effects", and are presented below.

Gross Domestic Product

Ellis Consulting Services (2000) estimated the contribution to NWT GDP that resulted from barren-ground caribou outfitting in 1999 to be $3.13 million, of which $2.38 million resulted from direct activity and the remaining $747,000 from indirect and induced activity.

The contribution to NWT GDP of nine barren-ground caribou outfitters in 1993 was estimated to be $1.92 million (Exceleration Corp 1994). However, caution should be used in comparing results from Exceleration Corp. (1994) to results in the present report (see footnote no. 2).

Ellis Consulting Services (no date) also did an input-output analysis on the expenditures of visitors to the NWT between May and September 1998 collected during an NWT visitor exit survey. Of a total of $25.4 million estimated to have been spent by tourists in the NWT from May to September of 1998, the contribution to NWT GDP was estimated to be $10.1 million. While a comparison of the GDP results of Ellis Consulting Services (2000) and Ellis Consulting Services (no date) suggests a large impact of barren-ground caribou hunters relative to all visitors (including business travellers) to the NWT, two points of caution regarding comparison should be made:

1) Ellis Consulting Services (no date) did not include any airline expenditures of NWT visitors, whereas Ellis Consulting Services (2000) included 25% of airline travel cost in estimates of expenditures by non-resident barren-ground caribou hunters within the NWT.

2) The 1998 visitor exit survey, which provided the visitor expenditures on which the analysis of Ellis Consulting Services (no date) was based, made no attempt to ensure that sampling was weighted to different types of visitors. As a result, small groups (like non-resident big-game hunters) are likely underrepresented in the results.

Both factors would cause an underestimate of GDP by Ellis Consulting Services (no date). Nonetheless, this comparison is still indicative of the per person impact of non-resident barren-ground caribou hunters.

Tax Revenue

Ellis Consulting Services (2000) also estimated that $926,000 of tax revenue was generated by the territorial and federal governments from the direct, indirect and induced activity of barren-ground caribou outfitters and non-resident barren-ground caribou hunters. The Government of the NWT received an estimated $183,000 in personal and corporate income taxes from economic activity resulting from barren-ground caribou outfitting, and $307,000 from hunting licence, tag and trophy fees paid by non-resident barren-ground caribou hunters. The federal government received an estimated $398,000 in personal and corporate income taxes. Outfitters also paid an estimated $38,000 in other taxes.

Labour Income

The portion of barren-ground caribou-outfitting-generated GDP that contributed to labour income was estimated to be $1.72 million (Ellis Consulting Services 2000). This means that $1.72 million in personal incomes to NWT residents resulted from the direct, indirect and induced activity of barren-ground caribou outfitters and non-resident barren-ground caribou hunters.

Jobs

Ellis Consulting Services (2000) estimated 179 direct seasonal jobs resulted from the activity of barren-ground caribou outfitters, with an additional 63 direct seasonal jobs resulting from non-outfitter expenditures of non-resident hunters. A further 55 seasonal jobs resulted from indirect and induced activity.

Table 3 shows a listing of the number and type of jobs with barren-ground caribou outfitters in 1999, the person-weeks of employment that resulted, and the communities of residence of those employees. Further community detail is shown in Appendix 1.

The estimated 179 NWT seasonal outfitting jobs from Ellis Consulting Services (2000) differ from the 109 NWT seasonal outfitting jobs shown in Table 3. The difference is due to two factors:

1) the intensity of activity during the operating season of outfitters (typically five to seven weeks starting mid-August), and the resulting long days and weeks for staff, and
2) the need to have standard or conventionally-defined work-weeks and job-lengths in input-output modelling and analysis.

Table 3 shows the number of jobs in barren-ground caribou outfitting, but makes no attempt to set a standard work-week (40 hours) or job-length (52 weeks). Some of the 109 NWT jobs in outfitting may be only one week of employment; others are 52 weeks of employment. Work-weeks could vary from a few hours a week up to 15 or more hours per day and seven days per week. While this lax job definition provides useful statistics to identify the number of people who worked in the barren-ground caribou outfitting industry, it is of limited value for input-output modelling, which requires more precise definitions. For input-output modelling, conventional full-time jobs are usually limited to 40 hours per week because of the need for standards to incorporate all economic activity: full-time, part-time and seasonal employment.

Table 3. NWT Barren-ground Caribou Outfitters Jobs Summary

Type of Jobs	Total No. of Jobs	Total Person-weeks	NWT Person-weeks	Community of Staff Residence			
				Total NWT	Yellow-knife[10]	Small Comm-unity[11]	Non-NWT[12]
Management & Administration	19	411	356	16	14	3	3
Cooks / Management	3	21	11	1	0	1	1
Cooks / Housekeeping	10	89	89	10	8	3	0
Chefs / Cooks	6	41	25	4	4	0	3
Guides	88	470	342	64	25	39	24
Maintenance / Helpers	9	43	43	9	1	8	0
Taxidermist	1	8	8	1	1	0	0
Drivers / Expeditors	4	8	8	4	3	1	0
Total - all Job Types	**139**	**1,090**	**880**	**109**	**54**	**54**	**30**

Note: Totals may not add due to rounding.

For example if a hunting guide worked 10-hour days, and seven-day weeks for six weeks with only a few days off due to poor weather, for input-output analysis that job would be converted to nearly 12 person-weeks of employment and nearly two seasonal

[10] Includes Hay River, and some N'dilo.
[11] Dettah/N'dilo, Lutsel K'e, Rae-Edzo, Rae Lakes, Wekweti.
[12] Includes Kitikmeot region of Nunavut.

jobs. In this way, the number of jobs reported by Ellis Consulting Services (2000), exceed those in Table 3.

Of a total of 1,090 person-weeks of direct employment in NWT barren-ground caribou outfitting in 1999, a total of 880 person-weeks of employment was attributed to NWT-residents (Table 3).

Most outfitters and their staff reside in the NWT, with equal numbers residing in Yellowknife and the smaller communities around Yellowknife (Table 3). The remaining outfitters and staff are non-residents of the NWT, although some are former residents of the NWT who have moved south but continue to have a seasonal link the NWT, or are no longer residents of the NWT because of division with Nunavut (residents of the Kitikmeot region). With respect to NWT-residents, most of the managers, administrative personnel, cooks and chefs reside in Yellowknife. Nearly half of the hunting guides reside in the smaller communities, with the remainder equally divided between Yellowknife residents and non-NWT residents. Community detail is provided in Appendix 1.

Economic impact estimates from the input-output analysis will also include some error. This results, in part, from the input-output model structure that is based on estimates of expenditure patterns of businesses and consumers in Yellowknife and the NWT. Secondly, as noted above, both outfitter and hunter expenditure estimates have sampling error in them. In addition to these sources of sampling error, input-output models, as with all models, make a number of simplifying assumptions that are not realistic, but are required of models. Together these result in some unknown level of error in the economic impact estimates.

Replacement Value of Caribou Meat

Non-resident hunters at barren-ground caribou outfitter camps harvested about 41,500 kilograms of caribou meat. This meat had a replacement value in Yellowknife in May 2000 ranging from about $395,000 based on the weighted-average method to about $500,000 based on the bulk-pack method. Caribou meat harvested by non-resident hunters at outfitter's camps has a number of uses and the benefits to the NWT vary with the particular use.

Almost all non-resident hunters export some of the meat from the one or two caribou they harvest in their outfitted hunt. A few export no meat, and it is not uncommon for non-resident hunters to export all the meat from their caribou. At least one outfitter encourages hunters to export all the meat. Almost 14,000 kg (34% of the total) of meat was exported from the NWT by hunters (Tables 4 and 5). At Yellowknife replacement values, this meat has an estimated value of $183,000 (46% of the total Yellowknife replacement value) using the weighted-average method (Table 4). The larger percentage of value relative to weight is a result of the assumption that non-resident hunters export two-thirds of the best cuts from their caribou and little of the lower quality cuts[13]. This has the effect of raising the average replacement value of meat exported by non-resident hunters. The bulk-pack method values this meat at $168,000 (Table 5).

[13] The lower-quality cuts that were exported by non-resident hunters were done so by hunters who exported all their meat.

Regardless of the valuation method used, caribou meat exported by non-resident hunters has no benefit to the NWT.

Table 4. Replacement value (weighted-average method) of barren-ground caribou meat harvested during outfitted hunts by non-resident hunters.

Caribou Meat Use	Edible Weight (kg)	% by Wt.	Yellowknife Replacement Value	% by Value	Food Price Index[14]	Benefit to NWT
Exported by Hunters	13,907	34%	$182,934	46%		N/A
Consumed in Camp	4029	10%	56,503	14%		$56,503
Given to:						
Dettah/N'dilo	2,772	6.7%	18,379	4.6%	100	18,379
Holman	115	0.3%	763	0.2%	168	1,282
Lutsel'ke	670	1.6%	4,442	1.1%	169	7,507
Rae-Edzo	5,791	14%	38,392	10%	120	46,071
Rae Lakes	335	0.8%	2,221	0.6%	137	3,043
Wekweti	2,655	6.4%	17,601	4.5%	160	28,161
Yellowknife	8,396	20%	55,665	14%	100	55,665
Total NWT	20,734	50%	137,464	35%		160,109
Kitikmeot	2,773	6.7%	18,387	4.7%		N/A
Total given	23,507	57%	155,851	39%		
Total Caribou Meat	**41,444**	**100%**	**$395,288**	**100%**		**$216,612**

Detailed calculations in appendices 2 and 3.

Hunters and outfitting staff also consume a substantial amount of caribou meat at the hunting camps, although it varies considerably among outfitters. Some prepare and serve caribou every day, others every few days, and some only when a hunter requests it. Overall, an estimated 4,000 kg of caribou meat (10% of the total) was consumed at camps. Meat consumed in camp is assumed to be cuts of higher quality. The Yellowknife replacement value of caribou meat consumed at camps was estimated to be $56,500 (14% of the total) based on the weighted-average method (Table 4) and $48,700 (10%) based on the bulk-pack method (Table 5).

It could be argued that the replacement value of the caribou meat consumed in camps, should reflect the cost of transportation of the beef substituted for the replacement value estimation from the point of market pricing (Yellowknife) to the hunting camp. However, the Yellowknife replacement value may provide the appropriate price. If outfitters chose not to serve caribou meat, they would likely replace it with beef, the most consistently-available market product that is similar to caribou (as per replacement value theory), for which they would pay $48,700 to $56,500, assuming no supplier discounts. But it is unlikely any additional transportation costs would be incurred to deliver the substitute beef to outfitting camps, since space on existing air charters into camps would likely hold this substitute meat (average of 57 kg per week per outfitter).

An estimated 23,500 kg of the caribou meat (57% of the total) harvested by non-resident hunters at outfitter camps was given to guides and other outfitter staff (Tables 4 and 5). This meat was transported to their home communities for personal use and for

[14] Bureau of Statistics, Government of the NWT (1999).

distribution to family and friends. The Yellowknife replacement value of this meat to NWT communities was estimated to be $137,500 using the weighted-average method (Table 4) and $250,500 using the bulk-pack method (Table 5).

Table 5. Replacement value (bulk-pack method) of barren-ground caribou meat harvested during outfitted hunts by non-resident hunters.

Caribou Meat Use	Edible Weight (kg)	% by Wt.	Yellowknife Replacement Value	% by Value	Food Price Index[15]	Benefit to NWT
Exported by Hunters	13,907	34%	$167,970	34%		N/A
Consumed in Camp	4029	10%	48,667	10%		$48,667
Given to:						
Dettah/N'dilo	2,772	6.7%	33,483	6.7%	100	33,483
Holman	115	0.3%	1,390	0.3%	168	2,336
Lutsel'ke	670	1.6%	8,093	1.6%	169	13,767
Rae-Edzo	5,791	14%	69,941	14%	120	83,929
Rae Lakes	335	0.8%	4,046	0.8%	137	5,543
Wekweti	2,655	6.4%	32,064	6%	160	51,303
Yellowknife	8,396	20%	101,408	20%	100	101,408
Total NWT	20,734	50%	250,425	50%		291,679
Kitikmeot	2,773	6.7%	33,497	6.7%		N/A
Total given	23,507	57%	283,922	57%		
Total Caribou Meat	**41,444**	**100%**	**$500,559**	**100%**		**$340,346**

Detailed calculations in Appendices 2 and 3.

However, the real economic value of meat in NWT communities other than Yellowknife can be substantially greater than its value in Yellowknife. This is due mainly to the high freight costs of moving goods like food from Yellowknife to communities, many of which are not on road systems. Community food price indices are established by the Bureau of Statistics, Government of the NWT (1999) to estimate this freight-cost premium. The community indices range from a low of 100 for Yellowknife, Dettah and N'dilo up to 169 for Lutsel K'e. Applying these food price indices to the Yellowknife replacement values for meat given to NWT communities increases the value of this meat from $137,500 to $160,100 using the weighted-average method (Table 4), and from $250,400 to $291,700 for the bulk-pack method (Table 5). Details of these calculations are shown in Appendix 3.

The economic value of caribou meat in northern communities is affected to some extent by seasonal availability of barren-ground caribou. While Kitikmeot (eastern Nunavut) communities have access to Victoria Island and mainland caribou herds in different seasons, the same is not true for NWT communities south of the tree-line. The Bathurst herd moves off its winter range in the boreal forest in spring, and is no longer as readily available to these communities as it was during winter months. Although community caribou hunts to the tundra by aircraft are not uncommon in autumn, the additional cost of air charters increases the cost, and thus the value, of caribou obtained in this manner, relative to caribou harvested in winter. Therefore, to have caribou meat given to

[15] Bureau of Statistics, Government of the NWT (1999).

residents of communities during a time when it is otherwise only available at a higher than normal cost is of notable additional economic benefit.

Outfitters incur costs to store and transport caribou meat regardless of where and by whom it is consumed. In the case of caribou meat prepared routinely for camp meals, these costs may be small and may, in fact, be less than costs for imported meats. For meat exported by hunters, outfitters must store it at camp and prepare it for long-distance air-freight. This adds costs and logistical planning for outfitters; however, that is part of their primary business – client satisfaction.

It is a different matter for the 23,500 kg of caribou meat given to staff and communities. Not only do outfitters store this meat in camp, they also incur the cost of transporting it to Yellowknife or possibly other communities. Rough estimates of this cost, based on the cost of chartered twin otters from the camps to Yellowknife, range from $28,600 to $42,500. While this provides an upper estimate of the financial cost of making use of this meat, one outfitter noted that the large amount of meat needing to be transported out of camps is part of planning. Outfitters therefore make the best use of outgoing charters from their camps to move this meat.

Economic Benefits Summary

The estimated economic benefits of barren-ground caribou outfitting to the NWT in 1999, discussed in preceding sections, are summarized and presented relative to 1993 in Table 6. The substantial growth in the industry is evident from this presentation of numbers. Table 6 also presents the estimated NWT economic impact (contribution to NWT GDP) from each non-resident barren-ground caribou hunter to be $5,300. Alternatively, the NWT economic impact of each caribou allocated to outfitting is estimated to be $3,400. This type of analysis demonstrates the high economic benefit from the use of renewable resources by industries with high value-added characteristics, like tourism.

Preceding sections of this report outline the community of residence of those employed in outfitting jobs, as well as the value of caribou meat estimated to have been transported to communities. These two benefits are summarized by community in Table 7.

Table 6. Summary of Estimated Economic Benefits of Barren-ground Caribou Outfitting to the NWT

	1993 [16]	1999
Number of Outfitters	9	10
Number of Hunters	303	595
Number of Caribou Harvested	409	921
Gross Outfitter Revenue	$1.65 million	$3.26 million
Number of Seasonal Jobs in Outfitting [17]	95	179 109
Direct Employment (person-weeks)	-	880
Outfitter Expenditures in NWT	$1.25 million	$2.23 million
Hunter Expenditures in NWT (other than to Outfitters)	$350,000	$979,000
Economic Impact (contribution to NWT GDP)	$1.92 million [18]	$3.13 million
Economic Impact (contribution to NWT GDP) per Hunter	- [19]	$5,300
Economic Impact (contribution to NWT GDP) per Caribou Allocated to Outfitting	- [20]	$3,400
Tax Revenue to GNWT	$304,000	At least $490,000
Replacement Value of Caribou Given to NWT Communities	Not estimated	$160,100 to $291,700

16 From Exceleration Corp. (1994).

17 The 1993 figure of 95 and the 1999 figure of 179 are probably comparable. No detail was provided by Exceleration Corp. (1994) as to the source or calculation of the 95 figure. The figure of 179 represents the number of seasonal jobs for input-output analysis purposes. The 1999 figure of 109 represent the number of jobs on a person by person basis.

18 Exceleration Corp. (1994) did not provide the source for multipliers used to determine NWT economic impact and the multipliers used are undoubtedly too high. It appears that economic multipliers may have been confused for intensity ratios. If this were the case, the estimate of total NWT economic impact (contribution to NWT GDP) in Exceleration Corp.'s (1994) would actually be the total national or international economic impact of NWT barren-ground caribou outfitting.

19 For the reasons described in the previous footnote, these statistics are not presented.

20 See previous footnote.

Table 7. Community Benefits Summary

Community	Number of Jobs	Replacement Value of Caribou Meat
Dettah/N'dilo	7	$18,400 - $33,500
Hay River	1	-
Holman	-	$1,300 - $2,300
Lutselk'e	4	$7,500 - $13,900
Rae-Edzo	31	$46,100 - $84,900
Rae Lakes	3	$3,000 - $5,500
Wekweti	9	$28,200 - $51,300
Yellowknife/N'dilo	53	$55,700 - $101,400
All NWT Communities	**109**	**$160,000 - $292,000**

Note: Columns may not add due to rounding.

Other Benefits - Non-Economic

This report identifies and measures economic benefits from the use of barren-ground caribou. There are, however, substantial non-economic values and benefits associated with the harvesting and use of wildlife by both Aboriginal (Usher 1976; Beckley & Hirsch 1997) and non-Aboriginal (Leopold 1966) people. Some of these values will accrue to hunting guides through their involvement in the hunts and to others who benefit from the caribou meat distributed in NWT communities. Though such values and benefits are acknowledged to be very important, a discussion of them is beyond the scope of this report.

Outfitters identified two other non-economic benefits of their operations. At least two outfitters occasionally "split" air charters with private groups where the two-way cost of an air charter is shared between two parties, who each have a payload to be moved in the opposite direction.

One outfitter also indicated that his camp had been provided without charge to researchers studying water quality in the off-season.

Conclusion

Barren-ground caribou outfitting in the NWT has shown fairly constant growth since its commencement in the early 1980s and has continuously demonstrated a high proportion of benefits to the NWT (Table 6).

Of the $3.26 million in gross revenue of 10 outfitters operating in 1999, an estimated $2.23 million was spend on NWT goods and services to operate their outfitting businesses. Non-resident barren-ground caribou hunters spent an additional $979,000 on non-outfitter purchases within the NWT. Combined, these outfitter and hunter expenditures were estimated to have contributed $3.13 million to NWT gross domestic product (GDP). Of this, $1.72 million was estimated to have been labour (personal) income.

The NWT barren-ground caribou outfitters provided jobs for an estimated 109 NWT residents, although for input-output analysis the number of seasonal jobs to NWT residents was estimated to be 179. The residency of those NWT residents employed in the outfitting jobs is evenly split between Yellowknife and the smaller communities surrounding Yellowknife (Table 7).

The estimated NWT economic impact (contribution to NWT GDP) that results from each non-resident barren-ground caribou hunter is $5,300 (Table 6). Alternatively, this could be presented as an estimated NWT economic impact of $3,400 per caribou allocated to outfitting (Table 6). In either case, these numbers demonstrate the high economic benefit that results from the use of renewable resources in industries with high value-added characteristics such as tourism.

The economic activity of barren-ground caribou outfitters in the NWT resulted in over $925,000 in tax revenue for the territorial and federal governments. At least $490,000 of this tax revenue accrued to the territorial government, mostly due to hunting licence, tag, and trophy fees.

Over half (20,700 kg) of the caribou meat harvested by non-resident barren-ground caribou hunters was given to outfitter staff and was transported to a number of communities in the NWT. The value of this meat in these communities was estimated to be between $160,100 and $291,700, depending on the method used.

The Legislative Assembly of the Northwest Territories (2000) has set four key priorities to guide the efforts of the Government of the NWT over the next four years. These priorities are generally reflected in the final report of the Economic Strategy Panel (2000) which contains recommendations to the Government of the Northwest Territoriesfor a new NWT economic strategy. One of these priorities is "a northern-controlled economy that is balanced, diversified, stable and vibrant" (Legislative Assembly of the Northwest Territories 2000). The degree to which an industry like tourism, and particularly barren-ground caribou outfitting with its high degree of NWT-resident staff and ownership and NWT expenditures, can contribute to such balance, diversity and stability is briefly noted below.

There is no doubt that non-renewable resource development is important to the NWT economy. Its potential for exports and for resource revenue for government is large.

However, promoting a diverse and balanced economy with many viable sectors will result in a more robust economy - an economy better able to withstand shocks caused by local and global economic forces.

Additionally, diversity in an economy provides more opportunity for domestic and other business investment, and choices for employment. As mentioned above, diversity and balance strengthen an economy and enable it to weather economic cycles, but just as importantly, diversity and balance in an economy provide options for residents when choosing employment and careers. Employment opportunities and options will ultimately lead to a higher quality of life for NWT-residents.

Promoting export industries that lead to new and earned dollars in an economy is an important development initiative. Such "new wealth" contrasts with transfer payments from government, or business activity that re-circulates existing dollars within an economy. While every economy will have business activity that re-circulates dollars, it is beneficial to be aware of those activities that inject "new wealth". As an export industry, tourism is one of these. Tourism is also a growth industry (Canadian Tourism Commission 1999), both nationally and internationally, and therefore has the potential to contribute to the continued development of the NWT economy.

Lastly, wildlife management can benefit from economic analysis, as well as the more conventional biological analysis. Economic analysis can provide wildlife managers with information on the contribution of wildlife to human welfare. Such information can and should be considered along with the benefits and values of other uses of barren-ground caribou when decisions affecting their management are made. Similarly, the contributions that caribou or other wildlife make to human welfare can and should also be considered during land use planning and integrated resource management exercises.

Acknowledgements

The interest and co-operation of the NWT Barren-ground Caribou Outfitters Association in this study was instrumental in gathering the data and completing the work. Their President, Jim Peterson, was particularly interested in the work and helpful in seeing it completed.

Alasdair Veitch, Anne Gunn, Richard Zieba and Jennifer Lange of the Department of Resources, Wildlife and Economic Development provided comments on a draft of this report. Many of these comments were incorporated.

The map (Figure 1) was prepared by Norm Mair of the NWT Centre for Remote Sensing.

Personal Communication

Tim Devine, Regional Wildlife Manager, Inuvik Region, RWED, GNWT, Inuvik. 1998-12-3.

Anne Gunn, Ungulate Biologist, Wildlife and Fisheries Division, RWED, Yellowknife. 2000-7-17.

John Nagy. Supervisor, Wildlife Management, Inuvik Region, RWED, Inuvik. 2000-8-24.

Alasdair Veitch, Supervisor, Wildlife Management, Sahtu Region, RWED, GNWT, Norman Wells. 2000-8-9.

Literature Cited

Adamowicz, W.L., J. Asafu-adjaye, P.C. Boxall, & W.E. Phillips. 1991. Components of the economic value of wildlife: an Alberta case study. Canadian Field Naturalist 105(3): 423-429.

Adamowicz, W. 1992. Non-timber values in Canadian Forests: an assessment of uses, techniques and data availability. Project Report 92-02, Department of Rural Economy, University of Alberta, Edmonton. 35pp + appendices.

Ashley, Bruce. In preparation. Edible weights of wildlife and fish used for country food in the Northwest Territories and Nunavut. Manuscript in preparation.

Beckley, T.M. & B.H. Hirsch. 1997. Subsistence and non-industrial forest use in the lower Liard Valley. Nat. Resour. Can., Can. For. Serv., North. For. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-352. 42pp.

Boone and Crocket Club. 1984. Boone and Crockett News. Volume 1, no. 1. (quoted from Renewable Resources 1988)

Brown, Edward K. 1992. Putting economics to work in fish and wildlife management. Missouri Department of Conservation, Planning Division. Public Profile 7-91. 38pp.

Bureau of Statistics, Government of the NWT. 1993. Northwest Territories economic multipliers 1992. Bureau of Statistics, Government of the Northwest Territories, Yellowknife. 17pp.

Bureau of Statistics, Government of the NWT. 1999. Food price indexes. Statistics Quarterly 21(3):22.

Canadian Tourism Commission. 1999. Annual Report 1998. http://www.canadatourism.com/en/ctc/tourismresources/research/research_ms.cfm

Case, Ray, Laurie Buckland, & Mark Williams. 1996. The status and management of the Bathurst caribou herd, Northwest Territories, Canada. File Report No. 116. Department of Renewable Resources, Government of the Northwest Territories. Yellowknife, NWT. 34pp.

Decker, D.J., & G.R. Goff (eds.). 1987. Valuing wildlife: economic and social perspectives. Westview Press, Boulder, Colorado. 637pp.

Economic Strategy Panel. 2000. Common ground: NWT economic strategy 2000. Recommendations to the Government of the NWT. 87pp.

Ellis Consulting Services. 2000. The economic impact of NWT barren-ground caribou outfitters: the impact on the NWT economy of the barren-ground caribou outfitter industry in 1999. Report prepared for the Wildlife and Fisheries Division, Department of Resources, Wildlife and Economic Development, Government of the NWT, Yellowknife. 8pp.

Ellis Consulting Services. No date. Visitor spending in the NWT: the economic impact on the NWT economy from visitation during May to September 1998. Report prepared for the Community Economic Development Services Division, Department of Resources, Wildlife and Economic Development, Government of the NWT, Yellowknife. 16pp.

Exceleration Corp. 1994. Review of the Class 'B' barrenground caribou outfitters in Unit 'F': A Co-operative project of NWT Department of Renewable Resources, NWT Department of Economic Development and Tourism, Central Canadian Barrenground Caribou Outfitter and Guides Association. 88pp.

Exceleration Corp. 2000. Benefits of outfitted hunting in the NWT Mackenzie Mountains. Prepared for the Association of Mackenzie Mountains Outfitters, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories and the Town of Norman Wells. 45pp.

Filion, Fern L., Andre Jacquemot, Peter Boxall, Roger Reid, Pierre Bouchard, Elaine DuWors & Paul A. Gray. 1990. The importance of wildlife to Canadians in 1987: the economic significance of wildlife-related recreational activities. Canadian Wildlife Service, Environment Canada, Ottawa, Canada. 46pp.

Filion, Fern L., Andre Jacquemot, Elaine DuWors, Roger Reid, Peter Boxall, Pierre Bouchard, Paul A. Gray & Alistair Bath. 1994. The importance of wildlife to Canadians: the economic significance of wildlife-related recreational activities in 1991. Canadian Wildlife Service, Environment Canada, Ottawa, Canada. 46pp.

Gunn, Anne, Judy Dragon & John Nishi. 1997. Bathurst calving ground survey 1996. Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, File Report No. 119. 70pp.

Langford, William A. & Donald J. Cocheba. 1978. The wildlife valuation problem: a critical review of economic approaches. Canadian Wildlife Service Occasional Paper Number 37. Fisheries and Environment Canada. 37pp.

Latour, Paul & Norm MacLean. 1994. An analysis of data returned by outfitted hunters from the Mackenzie Mountains, NWT 1979-1990. Department of Renewable Resources, Government of the Northwest Territories, File Report No. 110. 41pp.

Lee, John, Mitch Taylor & Aiko Sutherland. 1994. Aspects of the polar bear harvest in the Northwest Territories, Canada. Department of Renewable Resources, Government of the Northwest Territories, File Report No. 113. 25pp + appendix.

Leigh, Luis, Elaine DuWors, Michel Villeneuve, Alistair Bath, Pierre Bouchard, Peter Boxall, Douglass Legg, Scott Meis, Roger Reid, & Tim Williamson. 2000. The importance of nature to Canadians: the economic significance of natures-related activities. Environment Canada, Ottawa, Canada. 49pp.

Legislative Assembly of the Northwest Territories. 2000. Towards a better tomorrow. Statement by the Vision and Priorities Caucus, 14th Legislative Assembly of the

Northwest Territories March 31, 2000.
http://www.assembly.gov.nt.ca/Members/BetterTomorrow.html

Leopold, A. 1966. A sand county almanac. Ballantine Books, New York. 226p.

Murphy, Daniel F. 1976. An assessment of non-resident sport hunting in the Mackenzie Mountains, Northwest Territories. MES major paper, Faculty of Environmental Studies, York University. Draft copy dated April 2, 1976. 258pp.

Renewable Resources, Government of the Northwest Territories. 1988. Bathurst caribou management plan -- draft. Department of Renewable Resources, Government of the Northwest Territories, Yellowknife, NWT. 28pp.

Usher, Peter J. 1976. Evaluating country food in the Northern Native economy. Arctic 29(2):105-120.

Veitch, Alasdair & Ellen Simmons. 2000. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary 1999. Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, Manuscript Report No. 121. 29pp.

Walsh, Richard G. 1986. Recreation economic decisions: comparing benefits and costs. Venture Publishing Inc., State College, Pennsylvania. 637p.

Williams, T. Mark. 1995. Beverly calving ground surveys: June 5-16, 1993 and June 2-3, 1994. Department of Renewable Resources, Government of the Northwest Territories, File Report No. 114. 36pp.

Appendix 1. NWT Barren-ground Caribou Outfitters Jobs Detail - 1999

Type of Jobs	# of Jobs	Person-weeks	NWT PWs	Community Residence of Staff → All NWT	Yellowknife / N'dilo	Hay R.	Dettah /N'dilo	Lutselk'e	Rae-Edzo	Rae L.	Wekweti	Small NWT Communities	Kitik.	Yukon	South	Non-NWT
Management / Administration	19	411	356	16	13	1			3			3			3	3
Cooks / Management	3	21	11	1							1	1			1	1
Cooks / Housekeeping	10	89	89	10	8		1		1			3				
Chefs / Cooks	6	41	25	4	4									1	1	3
Guides	88	470	342	64	25		6	4	19	2	8	39	16		8	24
Maintenance / Helpers	9	43	43	9	1				6	1		8				
Taxidermist	1	8	8	1	1											
Drivers / Expeditors	4	8	8	4	3				1			1				
Total - all Job Types	139	1,090	880	109	53	1	7	4	31	3	9	54	16	1	13	30

Appendix 2. Meat pricing in Yellowknife

per kg (except where otherwise noted)

	Beef	Beef	Beef	Beef	Caribou	Musk-ox		
	Extra Foods - Downtown 5/5/2000	Extra Foods - Frame Lake 5/8/2000	Northern Fancy Meats 5/8/2000	Average Prices Used to Price Substitutes	Northern Fancy Meats 5/8/2000	Northern Fancy Meats 5/8/2000	Substitute Cost	Proportion of Caribou
Low quality/price								
Ground								
regular	$4.37	$4.37	$6.90					
regular bulk	3.70	3.70		$3.70				
lean	6.57	6.57				$11.00		
lean - bulk	5.69			5.69				
extra lean		8.33						
extra Lean bulk		7.23						
Sausage						13.90		
Stew						14.22		
bulk	6.57			6.57				
Short ribs	6.57	6.57		6.57				
Medium quality/price								
Steak								
round	9.90			9.90		23.57		
blade	8.77							
blade - bulk	5.69			5.69				
Roast								
cross-rib	6.57			6.57				
round	7.98			7.98				
Stir-fry			12.98					
High quality/price								
Steak					$28.15			
sirloin	13.98		14.90	14.44				
T-bone		17.98	19.90					
T-bone bulk	16.98	16.98		16.98				
striploin		26.98	23.50					
striploin - bulk		22.98		22.98				
rib	16.98			16.98				
rib eye	$26.98	26.98	23.80	25.92				
Roast								
prime rib		$16.49	14.90	15.70				
oven ready			$10.90	$10.90				
hip						$23.57		
Low price substitute							$5.63	55%
Medium price substitute							7.54	15%
High price substitute							17.70	30%
Weighted average							$9.54	100%
50 pound pack (22.7 kg)			$274.50				$12.08	
consisting of:			5.49 per lb					
10 lb strip loin			$12.08 per kg					
10 lbs T-bone								
10 lbs minute steak								
10 lbs oven-ready roast								
10 lbs ground								

Appendix 3. Replacement Value Calculations of Caribou Meat from Barren-ground Caribou Outfitters

Outfitters Hunters Caribou	N=10 595 921	% of Total by wt	% of Given by wt	% of Varying Quality by wt		Yellowknife Replacement Value	Proportion of Meat by Yellowknife Replacement Value	Food Price Indices 1997	NWT Value of Caribou Meat (w'ted-aver. method)	NWT Value of Caribou Meat (bulk-pack method)
Exported by Hunters	13,907	34%								
Weighted-average Method				9.5%	low $	$22,176				
				4.5%	med $	14,053				
				20%	high $	146,705				
				34%		182,934	46%		N/A	
Bulk-pack Method						167,970	34%			N/A
Consumed in Camp	4,029	10%								
Weighted-average Method				0.0%	low $	0				
				4.0%	med $	12,491				
				6.0%	high $	44,012				
				10%		56,503	14%		$56,503	
Bulk-pack Method						48,667	10%			$48,667
Given to Communities										
Weighted-average Method	23,507	57%	100%	56%						
				46%	low $	106,212				
				6.5%	med $	20,298				
				4.0%	high $	29,341				
Dettah/N'dilo	2,772	6.7%	12%			18,379	4.6%	100	18,379	
Holman	115	0.3%	0.5%			783	0.2%	168	1,282	
Lutsel'ke	670	1.6%	2.9%			4,442	1.1%	169	7,507	
Rae-Edzo	5,791	14%	25%			38,392	9.7%	120	46,071	
Rae Lakes	335	0.8%	1.4%			2,221	0.6%	137	3,043	
Wekweti	2,655	6.4%	11%			17,601	4.5%	160	28,161	
Yellowknife	8,396	20%	36%			55,665	14%	100	55,665	
Total NWT	20,734	50%				137,464	35%		160,109	
Kitikmeot	2,773	7%	12%			18,387	4.7%		N/A	
Total Given (W'ted-aver.)	23,507	57%	100%			155,851	39%		160,109	
Bulk-pack Method										
Dettah/N'dilo	2,772	6.7%	12%			33,483	6.7%	100		33,483
Holman	115	0.3%	0.5%			1,390	0.3%	168		2,336
Lutsel'ke	670	1.6%	2.9%			8,093	1.6%	169		13,676
Rae-Edzo	5,791	14%	25%			69,941	14%	120		83,929
Rae Lakes	335	0.8%	1.4%			4,046	0.8%	137		5,543
Wekweti	2,655	6.4%	11%			32,064	6%	160		51,303
Yellowknife	8,396	20%	36%			101,408	20%	100		101,408
Total NWT	20,734	50%				250,425	50%			291,679
Kitikmeot	2,773	6.7%	12%			33,497	6.7%			N/A
Total Given (Bulk-pack)	23,507	57%	100%			283,922	57%			291,679
Total (weighted-average)	41,444	100%				395,288	100%		$216,612	
Total (bulk-pack)	41,444	100%				$500,559	100%			$340,346

Substitute Prices from Appendix 2.	$/kg	% of caribou
Low price substitute	$5.63	55%
Medium price substitute	7.54	15%
High price substitute	17.70	30%
Weighted-average	9.54	100%
Bulk-pack	$12.08	